

REMARKS

In the May 19, 2005 Office Action, claims 1-9 were rejected under 35 U.S.C. § 103(a). Claims 1 and 6-9 are amended to clarify salient features of the claimed invention. No new matter has been added. Claims 1-9 are pending. The rejections are traversed below.

Rejections under 35 U.S.C. § 103(a)

In item 2 on page 2 of the Office Action, claims 1-3 and 5-9 were rejected under 35 U.S.C. § 103(a) as unpatentable over Lin in view of Shih.

The Office Action alleged that Lin in Figures 13-15 shows "forming a first insulating layer 4 on a surface of a substrate 1; forming a photosensitive polymer layer 5 (corresponding to the claimed second photosensitive insulating resin layer) thereon" (Office Action, item 2, page 2, lines 12-16) which allegedly corresponds with "forming a first insulating layer on a surface of a substrate and forming a second photosensitive insulating resin layer thereon" (claim 1, line 4).

In contrast to this allegation in the Office Action which misinterprets the disclosure in Lin, nothing can be found in Lin that shows an insulating layer formed on the surface of a substrate in Figures 13-15 of Lin. Rather, reference numeral 4 is used in Lin in reference to "[a] passivation layer 4 ... deposited on top of layer 3" (Lin, paragraph [0048], lines 13-14) where layer 3 is described as "the totality of metal layers and dielectric layers that are typically created on top of the device layer 2" (Lin, paragraph [0048], lines 6-8), where "[d]evices 2 are formed in and on a semiconductor substrate 1" (Lin, paragraph [0046], line 3). Thus, in the device taught by Lin passivation layer 4 is separated from substrate 1 by conductive layer 2.

The Office Action in the rejection of claim 1 also misinterpreted the claimed invention as recited in claim 1. A method according to the invention includes "forming a first insulating layer on a surface of a substrate and forming a second, photosensitive insulating resin layer thereon" (claim 1, lines 2-3). In the embodiment illustrated in Figs. 1(a) and 1(b) of the application, Fig. 1(a) depicts a first insulating layer 41 formed on a substrate 40 and Fig. 1(b) depicts a second photosensitive insulating resin layer 42 formed on the first insulating layer (as described at least on page 7, at lines 24-28 and page 8, lines 2-16) with the result that two insulating layers are stacked on top of the substrate as illustrated in Fig. 1(b) of the application.

Furthermore, in Fig. 13 of Lin the surface that is exposed at the bottom of the pattern grooves is not the surface of passivation layer 4 and is not the surface represented by openings 7 and 7' as asserted in the Office Action at page 2, lines 18-19 (citing Lin, paragraph [0059]). Instead the surface that is exposed at the bottom of the pattern grooves is the surface of

bonding pad contact points 6 (see Lin, paragraph [0048]). Thus, based on the apparent misinterpretation of the disclosure of Lin compounded by the apparent misinterpretation of the claimed invention, the Office Action failed to establish a case of *prima facie* obviousness. Claim 1 is allowable, for at least these reasons.

Furthermore, claim 1 as amended recites "coating the upper surface of the conductor with a barrier layer, ... removing the resist pattern and also removing by etching the plating seed layer ... to form a wiring pattern ... [so that] the upper surface of the conductor filled in the pattern grooves is protected by the barrier layer" (claim 1, lines 14-18). Thus, claim 1, as amended clarifies the feature of the invention of protecting the conductor from etching erosion while forming the conductor wiring pattern so the wiring conductor exactly conforms to the pattern grooves without any variation in dimensions of the conductor. This is contrasted with "chemical mechanical polishing" (CMP) to form a conductor wiring pattern as taught in the applied art of record. Nothing has been cited or found in the applied art of record that teaches or suggests "coating the upper surface of the conductor with a barrier layer, and removing the resist pattern and also removing by etching the plating seed layer ... to form a wiring pattern" and thereby protecting the surfaces of the conductor from etching erosion during the wiring pattern formation process. Thus, nothing has been cited or found in Lin, Ahmad and Shih either considered individually or combined together that shows each limitation of claim 1 as amended. Therefore, claim 1 is in condition for allowance.

On page 4 of the Office Action, claims 2 and 3 were rejected because paragraph [0054] in Lin shows "a nickel cap layer is used to prevent copper corrosion" (Office Action, page 4, lines 5-6) such as corrosion due to environmental conditions. Nothing has been cited or found in Lin, Ahmad and Shih either considered individually or combined together that teaches or suggests the use of a barrier layer to prevent erosion due to etching can be equated to the use of a barrier layer to prevent environmental copper corrosion. In contrast to the "corrosion" theory of the Office Action, the "nickel barrier layer" (claim 3, line 2) in the claimed invention erosion is prevented during the process of forming a wiring pattern when removing the seed layer by etching, as described in the specification at least at page 4, lines 13-27. Thus, claims 2 and 3 are allowable for at least the reasons stated above. Furthermore, dependent claims 2-5 are allowable for the same reasons as amended claim 1.

On page 4 at lines 9-10 of the Office Action, independent claim 6 was rejected solely because allegedly "opening 7" of Fig. 13 corresponds to the claimed "lowest horizontal surface" (Office Action, page 4, lines 9-10). The rest of the limitations of claim 6 were ignored. Nothing

was cited or found in the applied art that teaches or suggests "light-exposing and developing the second insulating layer to form one or more conductor paths having inner surfaces sidewalls and a lowest horizontal surface so that the first insulating layer is exposed as the lowest horizontal surface of each of said one or more conductor paths" (claim 6, lines 4-6). Thus, the Office Action failed to cite where in the applied art each limitation of claim 6 is shown. For at least these reasons, claim 6 is condition for allowance. Furthermore, claim 6 has been amended to recite limitations similar to those discussed above with respect to claim 1 and thus, claim 6 and claims 7 and 8 which depend therefrom are allowable at least for the same reasons as claim 1.

On page 4 of the Office Action, claim 9 was rejected because "the CMP process of the combined method removes the seeding layer" (Office Action, page 4, line 17). This is in contrast to the invention where the seed layer on the surface of the second insulation layer is removed by etching as recited in independent claims 1, 6 and 10 and as described in the specification at least at page 9, lines 31-37. Furthermore, the seed layer remaining adjacent to the conductor, as defined by the shape of the conductor paths helps protect the "sidewalls and ... bottom of ... the conductor paths ... from erosion" (claim 9, last 3 lines) during etching; thus, maintaining uniform dimensions of the conductor during formation of the conductor wiring pattern. Therefore, claim 9 is allowable for at least these reasons. Furthermore, claim 9 is allowable for the same reasons as claim 6 from which it depends.

In the paragraph spanning pages 4 and 5 of the Office Action, dependent claim 4 is rejected as unpatentable over Lin in view of Shih and further in view of Ahmad. Claim 4 is allowable for at least the same reasons as independent claim 1 from which it depends.

Conclusion

It is submitted that Lin, Shih and Ahmad either considered independently or taken together to do not show the features of the present claimed invention. Thus, it is submitted that claims 1-9 are in condition for allowance.

If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

Finally, if there any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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